

REMARKS

The Examiner indicated that claim 25 would be allowable if rewritten to overcome the rejections under 35 U.S.C. §112, second paragraph, set forth in this Office action and to include all of the limitations of the base claim and any intervening claims. Applicants gratefully acknowledge the Examiner's indication of allowable subject matter.

Applicants have amended claims 7 and 12 only for the purpose of writing claims 7 and 12 in independent form including all of the limitations of the base claim and any intervening claims, but not adding any new limitations. Thus the amended claims 7 and 12 are the same as the originally submitted claims 7 and 12.

The Examiner rejected claim 25 under 35 U.S.C. §112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. In response, Applicants have amended claim 25 to clarify the invention.

The Examiner rejected claims 1, 4-6, 8-11, 13-16 and 22 under 35 U.S.C. §102(b) as allegedly being anticipated by Fitch et al. (US 5,213,989).

The Examiner rejected claims 22-24 under 35 U.S.C. §102(b) as allegedly being anticipated by Jang (US 6,177,325).

The Examiner rejected claim 2 under 35 U.S.C. §103(a) as allegedly being unpatentable over Fitch et al. (US 5,213,989).

The Examiner rejected claim 3 under 35 U.S.C. §103(a) as allegedly being unpatentable over Fitch et al. in view of Johnson (US 5,592,017).

The Examiner rejected claims 7 and 12 under 35 U.S.C. §103(a) as allegedly being

unpatentable over Fitch et al. and in view of Ozkan et al. (US 6,437,376).

The Examiner rejected claims 26-34 under 35 U.S.C. §103(a) as allegedly being unpatentable over Fitch et al. (US 5,213,989) in view of Sato (US 6,436,781).

Applicants respectfully traverse the §102(b) and §103(a) rejections with the following arguments.

35 U.S.C. §102(b): Fitch

The Examiner rejected claims 1, 4-6, 8-11, 13-16 and 22 under 35 U.S.C. §102(b) as allegedly being anticipated by Fitch et al. (US 5,213,989).

Applicants respectfully contend that Fitch does not anticipate claims 1, 10, and 22, because Fitch does not teach each and every feature of claims 1, 10, and 22. For example, Fitch does not teach “diffusing dopant from the dopant source layer into the epitaxial layer to form at least a portion of an extrinsic base for the transistor within the epitaxial layer, a first surface of said portion of the extrinsic base being in direct mechanical contact with the dopant source layer, said portion of the extrinsic base being disposed between the dopant source layer and an intrinsic base for the transistor, said intrinsic base being totally within the epitaxial layer, a second surface of said portion of the extrinsic base being in direct mechanical contact with the intrinsic base, **said second surface being opposite said first surface and not contacting said first surface**” (emphasis added).

The Examiner argues: “Re claim 1, Fitch et al. teach a method for forming a transistor, the method comprising the steps of: providing a semiconductor substrate (12, Fig.7); forming an epitaxial layer (18, Fig.7:Col.3, lines 8-11); forming a dopant source layer (50, Fig.9) on the epitaxial layer; and diffusing dopant from the dopant source layer into the epitaxial layer to form at least a portion of an extrinsic base (52, Fig.-10) for the transistor within the epitaxial layer, said portion of the extrinsic base being in direct mechanical contact with the dopant source layer, said portion of the extrinsic base being disposed between the dopant source layer (50) and an intrinsic base (44) for the transistor, said intrinsic base being totally within the epitaxial layer (18).”

The preceding argument by the Examiner requires the first surface of the portion of the extrinsic base 52 to be the surface interfacing with the dopant source 56, and the second surface of the portion of the extrinsic base 52 to be the surface interfacing with the intrinsic base 44. However, FIG. 10 of Fitch shows that said first and second surfaces of the extrinsic base 52 contact each other and are not opposite each other (see FIG. 10 of Fitch), in violation of claims 1, 10, and 22.

Based on the preceding arguments, Applicants respectfully maintain that Fitch does not anticipate claims 1, 10, and 22, and that claims 1, 10, and 22 are in condition for allowance. Since claims 2-6, 8-9, and 29-31 depend from claim 1, Applicants contend that claims 2-6, 8-9, and 29-31 are likewise in condition for allowance. Since claims 11, 12-16, and 32-34 depend from claim 10, Applicants contend that claims 11, 12-16, and 32-34 are likewise in condition for allowance. Since claims 23-28 depend from claim 22, Applicants contend that claims 23-28 are likewise in condition for allowance.

35 U.S.C. §102(b): Jang

The Examiner rejected claims 22-24 under 35 U.S.C. §102(b) as allegedly being anticipated by Jang (US 6,177,325).

Applicants respectfully contend that Jang does not anticipate claim 22, because Jang does not teach each and every feature of claim 22. For example, Jang does not teach “diffusing dopant from the dopant source layer into the epitaxial layer to form at least a portion of an extrinsic base for the transistor within the epitaxial layer, a first surface of said portion of the extrinsic base being in direct mechanical contact with the dopant source layer, said portion of the extrinsic base being disposed between the dopant source layer and an intrinsic base for the transistor, said intrinsic base being totally within the epitaxial layer, a second surface of said portion of the extrinsic base being in direct mechanical contact with the intrinsic base, said second surface being opposite said first surface and not contacting said first surface” (emphasis added).

The Examiner argues: “Re claim 22, Jang teaches a method for forming bipolar transistor on a semiconductor substrate, the method comprising the steps of: providing a semiconductor substrate (112, Fig.6); forming an epitaxial layer (116) on the semiconductor substrate; forming a dopant source layer (13-, Fig.7) on a first portion of the epitaxial layer; forming an emitter material (131, Fig.10) on a second portion of the epitaxial layer, said second portion of the epitaxial layer being adjacent to said first portion of the epitaxial layer; diffusing dopant from the dopant source layer into the epitaxial layer to form at least a portion of an extrinsic base (124, Fig.11: Col.4, line 66-Col.5, line 1) for the transistor within the epitaxial layer, said portion of the extrinsic base being in direct mechanical contact with the dopant source layer, said portion of the

extrinsic base being disposed between the dopant source layer and an intrinsic base (122) for the transistor, said intrinsic base being totally within the epitaxial layer; and diffusing emitter dopant from the emitter material into said second portion of the epitaxial layer, said emitter dopant diffusion forming an emitter (129) for the transistor, said emitter being totally within the epitaxial layer, said emitter being surround by said portion of the extrinsic base."

The preceding argument by the Examiner requires the first surface of the portion of the extrinsic base 124 to be the surface interfacing with the dopant source 130, and the second surface of the portion of the extrinsic base 124 to be the surface interfacing with the intrinsic base 122. However, FIG. 10 of Fitch shows that said first and second surfaces of the extrinsic base 124 contact each other and are not opposite each other (see FIG. 10 of Fitch), in violation of claims 1, 10, and 22.

Based on the preceding arguments, Applicants respectfully maintain that Jang does not anticipate claim 22, and that claim 22 is in condition for allowance. Since claims 23-28 depend from claim 22, Applicants contend that claims 23-28 are likewise in condition for allowance.

35 U.S.C. §103(a): Fitch in View of Johnson

The Examiner rejected claim 3 under 35 U.S.C. §103(a) as allegedly being unpatentable over Fitch et al. in view of Johnson (US 5,592,017).

Since claim 3 depends from claim 1, which Applicants have argued *supra* to be patentable under 35 U.S.C. §102(b), Applicants maintain that claim 3 is not unpatentable under 35 U.S.C. §103(a).

35 U.S.C. §103(a): Fitch in View of Ozkan

Applicants have amended claims 7 and 12 only for the purpose of writing claims 7 and 12 in independent form including all of the limitations of the base claim and any intervening claims, but not adding any new limitations. Thus the amended claims 7 and 12 are the same as the originally submitted claims 7 and 12.

The Examiner rejected claims 7 and 12 under 35 U.S.C. §103(a) as allegedly being unpatentable over Fitch et al. and in view of Ozkan et al. (US 6,437,376).

Applicants respectfully contend that claims 7 and 12 are not unpatentable over Fitch in view of Ozkan, because Fitch in view of Ozkan does not teach or suggest each and every feature of claims 7 and 12. For example, Fitch in view of Ozkan does not teach or suggest “wherein the step of forming a pedestal comprises forming a high pressure oxide layer, a nitride layer, and an oxide layer, and patterning the high pressure oxide layer, nitride layer and oxide layer” (emphasis added).

The Examiner argues: “Fitch et al. teach the step of forming a pedestal comprises forming silicon dioxide (22), a nitride layer (40), and an oxide layer (42), and patterning the silicon dioxide, nitride layer and oxide layer (Figs. 7 & 8). However, Fitch et al. do not teach the silicon dioxide is high pressure oxide layer (HIPOX). Ozkan teaches forming high pressure oxide layer (132, Fig. 10) on the SiGe layer. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to form oxide layer under high pressure as taught by Ozkan in Fitch's device, since HIPOX layer is wet etched by a quick HF dip so that the emitter windows reveals SiGe base without damage.”

Applicants next present arguments as to why Applicants do not consider the Examiner's

argument to be persuasive.

As a first argument why the Examiner's argument is not persuasive, the Examiner has alleged that Fitch teaches patterning and etching of the silicon dioxide layer 22, the nitride layer 40, and an oxide layer 42 in the transition from FIG. 7 to FIG. 8, revealing layer 44 which the Examiner alleges is a SiGe base. However, the patterning and etching taught by Fitch reveals the layer 44 without damage. Therefore, modifying Fitch's oxygen layer 42 by Ozkan's HIPOX method would not add the advantage alleged by the Examiner, but would instead add an unnecessary process expense.

As a second argument why the Examiner's argument is not persuasive, Applicants contend that the Examiner has not provided any evidence that Fitch's wet etch by a quick HF dip is any less likely to cause damage to Fitch's layer 44 than is any of the etch methods disclosed by Fitch in col. 6, lines 13-31.

As a third argument why the Examiner's argument is not persuasive, Applicants note that the Examiner has not provided any evidence that wet etching of Fitch's oxide layer 42 by a quick HF dip is less likely to cause damage to Fitch's layer 44 if the oxide layer 42 is formed by a HIPOX process than if the oxide layer 42 is formed by a non-HIPOX process.

Based on the preceding arguments, Applicants respectfully maintain that claims 7 and 12 are not unpatentable over Fitch in view of Ozkan, and that claims 7 and 12 in condition for allowance.

35 U.S.C. §103(a): Fitch in View of Sato

The Examiner rejected claims 26-34 under 35 U.S.C. §103(a) as allegedly being unpatentable over Fitch et al. (US 5,213,989) in view of Sato (US 6,436,781).

Since claims 26-34 depend from claim 22, which Applicants have argued *supra* to be patentable under 35 U.S.C. §102(b), Applicants maintain that claims 26-34 are not unpatentable under 35 U.S.C. §103(a).

CONCLUSION

Based on the preceding arguments, Applicants respectfully believe that all pending claims and the entire application meet the acceptance criteria for allowance and therefore request favorable action. If the Examiner believes that anything further would be helpful to place the application in better condition for allowance, Applicants invites the Examiner to contact Applicants' representative at the telephone number listed below. The Director is hereby authorized to charge and credit Deposit Account No. 09-0456 (IBM).

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